

CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

Shigeo Shingo was one of the industrial engineers at Toyota who has been credited with creating and formalizing Zero Quality Control (ZQC) (Grout. John R et al., 2009). It is a device used in manufacturing as part the Zero Quality Control method. The Zero Quality Control System (ZQC) is a mistake-proofing approach that prevents defects by monitoring processing conditions at the source and correcting errors that cause defects. Since it is human nature to make mistakes, ZQC does not blame people for errors, but instead finds ways to keep errors from becoming defects. In this breakthrough approach, mistake-proofing devices called Poka-yoke are used to check and give feedback about each product or operation in the process, not just a sample (Shingo, 1986).

A Poka-yoke is any mechanism in a lean manufacturing process that helps an equipment operator avoid (Yokeru) mistakes (Poka). Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur (Chen J C et al., 1996). Poka-yoke (pronounced “POH-kah YOH-kay) or mistake proofing was first identified by Shigeo Shingo in the 1960s when, as a statistical process control engineer, he became frustrated that he could not achieve zero defects in manufacturing processes. Shingo realized that there was a clear distinction to be made between a mistake and a defect. He also realized that “mistakes” were not always the fault of the operator particularly as the consequent defect becomes visible only at a later stage of the manufacturing processes (Bekenn et al., 2009).

In this study, based on the above mentioned definition, a Poka-yoke is defined as a device that either prevents or detects abnormalities, which might be detrimental either to product quality or to employees. Otherwise, it is a quality improvement methodology to prevent mistakes from happening to minimize the negative consequences (Saurin et al., 2012).

Nut identification is one or more nuts or fastening that used to identify the missing part. Design for efficient joining and fastening which is threaded fasteners (screws, bolts, nuts and washers) are time-consuming to assemble and difficult to automate. Where they must be used, standardize to minimize variety and use fasteners such as self threading screws and captured washers. Consider the use of integral attachment methods (snap-fit). Evaluate other bonding techniques with adhesives. Match fastening techniques to materials, product functional requirements, and disassembly/servicing requirements (Crow K, 1998)

Fastening is one area where the concept of Poka-yoke can yield huge gains. Assembly Magazine's capital spending survey found that 91% of plants using threaded fasteners in their products mount these fasteners manually, making them potential breeding grounds for operator mistakes. To error-proof manual screw driving operations, engineers can reduce the number of different screws required by assemblies as well as set up the line so that one operator takes care of installing one type of screw (Arebe et al., 2004).

Poka-yoke system is important to industry because Poka-yoke helps people and processes work right the first time. Poka-yoke refers to techniques that make it impossible to make mistakes. These techniques can drive defects out of products and processes and substantially improve quality and reliability. It can be thought of as an extension of failure mode effect analysis (FMEA). It can also be used to fine tune improvements and process designs from six-sigma Define-Measure-Analyze-Improve-Control (DMAIC) projects. The advantage of Poka-yoke device is simple Poka-yoke ideas and methods in product and process design can eliminate both human and mechanical errors, cheap and easy to implement within a production line, and that errors

are detected either before they occur, or before they become costly to correct (Bekenn et al., 2009).

Poka-yoke also have disadvantages such as not 100% effective, as it cannot eliminate all defects. Otherwise, it is not effective as the source inspection approach. This is however more effective than statistical sampling and does provide feedback in reducing defects. The goal of a Poka-yoke is to eliminate defects by preventing mistakes from occurring or at least detecting them at source rather than correct, at much greater cost, when they become defects or errors (Bekenn et al., 2009).

1.2 PROBLEM STATEMENT

In this project, Poka-yoke system depends on factors can be used wherever something can go wrong or an error can be made. It is a technique, a tool that can be applied to any type of process be it in manufacturing or the service industry. The problems that occur in the selected production line. Selected tools and techniques is important to identity major problems. The main type of defects found was mis-location, missing nut indication and half insert. Some possible causes for these three problems are workers not able to follow or are not following the standard operation procedure (SOP), inadvertent error, carelessness and no sensing device. Since human cause is the major factor in this problem, as well as method and machine factor, attempt will be made to employ Poka yoke or a mistake proofing technique.

However, this system can increase the productivity and eliminate or decrease defect but it is not always 100% probability elimination of all errors, in such cases it is the task of Poka-Yoke methods is detection as soon as possible. On the other hand, effective Poka-yoke devices make possible by reducing the time and cost of inspection to near zero. Many researchers using a Poka-yoke system to improve their productions such as in an automotive industry likely General Motors (GM), electronic industry and also in the management system.